

## Turbopump Design for Deep Throttling Capability, Phase I

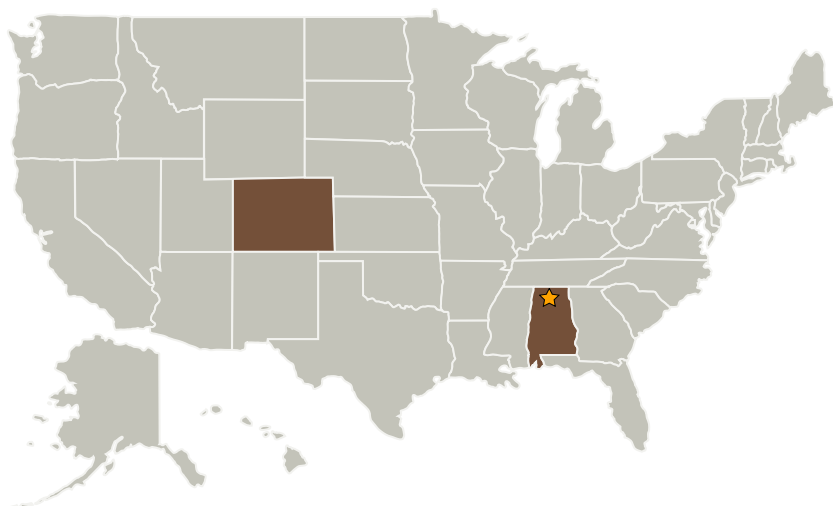
Completed Technology Project (2008 - 2009)



## Project Introduction

A rocket engine turbopump design using a partial emission pump combined with a zero net positive suction pressure inducer design is proposed to achieve a robust, deep throttling capability in 5k to 15k lbf thrust range rocket engines. A partial emission pump can provide better low-flow/thrust stability at a better efficiency than full emission pumps in this throttle range. A zero net positive suction pressure inducer will be able to perform with boiling flow at the inlet and at low flow conditions. This will enable deep throttling as well as restarts with minimal turbopump/engine thermal conditioning.

## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center (MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Barber-Nichols, Inc.	Supporting Organization	Industry	Arvada, Colorado

## Primary U.S. Work Locations

Alabama	Colorado
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## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Center / Facility:

Marshall Space Flight Center (MSFC)

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX01 Propulsion Systems
  - └ TX01.3 Aero Propulsion
    - └ TX01.3.1 Integrated Systems and Ancillary Technologies